

Katharine L. Page

Los Alamos National Laboratory Director's Postdoctoral Fellow
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Research

Current research (in the Total Scattering Group at Los Alamos National Laboratory, with Dr. Thomas Proffen) explores local bonding arrangements that promote amorphous-crystalline cyclability and lead to optical and electronic contrast in traditional and new phase-change materials. Ongoing research in linking local structure and macroscopic properties in ferroelectric oxides, with extension to behavior at small size. Expertise in synchrotron x-ray and neutron scattering methods for powders, nanoparticles, and thin films, including modeling tools for disordered, complex, and nanostructured materials.

Education

2004-2008 PhD in Materials, University of California Santa Barbara (with Ram Seshadri and Anthony K. Cheetham FRS). PhD thesis titled, *Local Structure Investigation of Bulk and Nanophase Perovskites*.

2000-2004 B.S. in Chemical Engineering, University of Maine.

Awards and Honors

2008 Los Alamos National Laboratory Director's Postdoctoral Fellow. Two years of support for independent postdoctoral work.

2008 Neutron Scattering Society of America Prize for Outstanding Student Research.

2006 National Science Foundation Graduate Research Fellowship. Three years of support for pursuit of PhD.

2006 American Crystallographic Association Margaret C. Etter Student Lecturer Award.

2006 NASA Harriet G. Jenkins Fellowship Recipient (honor accepted).

2005 National Science Foundation IGERT Fellowship. Two years support for pursuit of PhD.

2005 National Science Foundation Graduate Research Fellowship Honorable Mention.

2005 Coauthor of American Institute of Aeronautics and Astronautics, Microgravity and Space Processes Symposium Best Paper Award.

Notable extracurricular accomplishments

2009 - present Member of Los Alamos National Laboratory Postdoctoral Association. Served as secretary 2009, and president 2009-2010.

2003 - present Nationally competitive Olympic style weightlifter. Earned numerous top five finishes at USA National and American Open Championships, 2008 Olympic Trials Participant. 2007, 2008 and 2009 Collegiate National Champion, 69 kg class.

2000 - 2004 Division I varsity track athlete at the University of Maine. Received multiple top five finishes in the America East Conference indoor and outdoor track and field championships. Co-captain of varsity team for the 2002-2003 and 2004-2005 seasons, university discus record holder.

Employment

2009–Present Director's Postdoctoral Fellow with Dr. Thomas Proffen, Los Alamos National Laboratory, Los Alamos, NM. *Investigation of phase change alloys for electronic memory applications.*

Summer 2005 Materials Scientist with Dr. Mark Hampden-Smith, Cabot Superior Micropowders, Albuquerque, NM. *Novel materials preparation and post-processing techniques.*

Summers 2003 and 2004 Pre-Doctoral Researcher with Dr. Thomas Proffen, Los Alamos National Laboratory, Los Alamos, NM. *Neutron scattering of bulk and nanophase materials.*

Summer 2002 Pre-Doctoral Researcher, NASA Glenn Research Center, Cleveland, OH. *Turbulent diffusion flames in microgravity.*

Summer 2001 Pre-Doctoral Researcher, with Dr. William DeSisto at the Surface Science and Technology Laboratory University of Maine, Department of Chemical Engineering. *Gas separation membranes.*

Professional Memberships

American Ceramics Society (ACerS)

American Chemical Society (ACS)

American Crystallographic Association (ACA)

Materials Research Society (MRS)

Neutron Scattering Society of America (NSSA)

Invited Talks

1. *Probing Nanostructure in Functional Metal Oxides with X-ray and Neutron Total Scattering*, MS&T Conference, Houston, TX, October 2010.
2. *Probing Local Structure in Ferroelectric Perovskites*, NSLS User Group Meeting, New York, May 2010.

3. *Probing nanoscale structural features in ferroelectric perovskites with the pair distribution function*, Electronic Materials and Applications 2010, Orlando, FL, January 2010.
4. *Local structure studies of oxynitrides, ferroelectric perovskite oxides and related materials* Pittsburgh Diffraction Conference, Athens, GA, October 2009.
5. *Local structure in ferroelectric perovskites*, North American Solid State Chemistry Conference, Columbus, OH, June 2009.
6. *Local structure in ferroelectric perovskite oxides*, International Conference on Neutron Scattering, Knoxville, TN, May 2009.
7. *Probing size effects in functional metal oxide nanoparticles with the Pair Distribution Function*, Materials Research Society Spring Meeting, San Francisco, CA, April 2009.
8. *Materials studies on the nanoscale with the pair distribution function technique*, American Conference on Neutron Scattering, Santa Fe, NM, May 2008.
9. *Total scattering and the local structure of polar inorganic materials*, Materials Department Winter Colloquium, Santa Barbara, CA, March 2008.
10. *Probing the local structure of functional bulk and nanomaterials*, Materials Research Laboratory Outreach Program, Santa Barbara, CA, February 2008.
11. *Pair distribution function analysis of nanosystems*, American Crystallographic Association Annual Meeting, Honolulu, HA, July 2006.

Contributed Talks and Poster Presentations

1. K. Page, L. Daemon, and Th. Proffen, *Exploring Local Atomic Arrangements in Amorphous and Metastable Phase Change Materials With X-ray and Neutron Total Scattering*, Materials Research Society Spring Meeting, San Francisco, CA, April 2010.
2. K. Page, A. K. Cheetham, and R. Seshadri, *Total Scattering and the Local Structure of Functional Inorganic Materials*, American Conference on Neutron Scattering, Santa Fe, NM, May 2008.
3. K. Page, A. K. Cheetham, and R. Seshadri, *Local Structure in Functional Perovskites*, Cambridge-UCSB ICMR Workshop on Organic and Inorganic Opto-Electronic Materials, Cambridge, England, May 2008.
4. K. Page, A. K. Cheetham, and R. Seshadri, *Local Structure in Functional Perovskite Materials*, ICMR-JNCASR Winter School, Bangalore, India, December 2007.
5. K. Page, A. K. Cheetham, and R. Seshadri, *Pair Distribution Function Studies of Local Structure in Polar Inorganic Materials*, North American Solid State Chemistry Conference, College Station, TX, May 2007.
6. K. Page, J. Li, C. S. Schade, Y.-I. Kim, A. K. Cheetham, and R. Seshadri, *Real-space Structural Investigations of Some Inorganic Materials*, Materials Research Outreach Program, Santa Barbara, CA, January 2007.

7. K. Page, C. S. Schade, Th. Proffen, R. Seshadri, and A. K. Cheetham, *Real-Space Structural Refinement of Nanosystems by Total Scattering*, Materials Research Outreach Program, Santa Barbara, CA, January 2006.
8. K. Page, Th. Proffen, T. W. Darling, and J. A. TenCate, *Neutron Diffraction and Local Atomic Structure of Fontainebleau Sandstone: Evidence for an Amorphous Phase?*, American Geophysical Union Fall Meeting, San Francisco, CA, December 2004.

Workshop Tutorials and Presentations

1. K. Page, *Pair Distribution Function Methods: Capabilities and Future Directions*, Information Science for Materials Design and Discovery, Los Alamos National Laboratory, October 2009.
2. K. Page, *PDF Fitting: Practical Modeling Tutorial*, North American Solid State Chemistry Conference, Columbus, OH, June 2009. (Tutorial with V. Petkov.)

Book Chapters

1. K. Page, Th. Proffen, and R. B. Neder. *Structure of Nanoparticles from Total Scattering*. In E.J. Mittermeijer, editor, *Modern Diffraction Methods*, Weinheim, October 2010. Wiley Verlag GmbH.
2. K. Page and Th. Proffen. Nanoparticle Structure from Neutron Total Scattering: the Pair Distribution Function Approach. In A. Hurd and S. Sinha, editors, *Neutrons and Nanoscience*, New York, November 2010. Springer.

Publications

1. K. Page, J. K. Baldwin, Th. Proffen, Application of high energy x-ray pair distribution function methods to amorphous and polycrystalline thin films, submitted.
2. K. Page, C. E. White, Eben G. Estell, A. Llobet, Th. Proffen, Treatment of incoherent scattering in bulk and nanocrystalline neutron total scattering experiments, submitted.
3. K. Page, Th. Proffen, M. Niederberger, and R. Seshadri, Enhanced local dipoles in BaTiO₃ nanoparticles, submitted.
4. C. Wurden, K. Page, A. Llobet, C. E. White, and Th. Proffen, Extracting Differential Pair Distribution Functions using MIXSCAT, *J. Appl. Cryst.*, accepted.
5. W. B. Im, K. Page, S. P. DenBaars, and R. Seshadri, Probing local structure in the yellow phosphor LaSr₂AlO₅:Ce³⁺, by the maximum entropy method and pair distribution function analysis, *J. Mater. Chem.*, **19** (2009), 8761–8766. [DOI Link](#)
6. B. C. Melot, K. Page, R. Seshadri, E. M. Stoudenmire, L. Balents, D. L. Bergman, and Th. Proffen, Magnetic frustration on the diamond lattice of the A-site magnetic spinels CoAl_{2-x}Ga_xO₄: The role of lattice expansion and site disorder, *Phys. Rev. B*, **80** (2009) 104420[1–8]. [DOI Link](#)

7. K. Page, T. Kolodiaznyi, Th. Proffen, A. K. Cheetham, and R. Seshadri, Distinct local structures of Nb-substituted SrTiO_3 and BaTiO_3 from total neutron scattering: Implications for electronic properties, *Phys. Rev. Lett.* **101** (2008) 205502(1-4). [DOI Link](#)
8. K. Page, J. Li, R. Savinelli, H. N. Szumila, J. Zhang, J. K. Stalick, Th. Proffen, S. L. Scott, and R. Seshadri, Reciprocal space and real-space neutron investigation of nanostructured Mo_2C and WC, *Solid State Sci.* **10** (2008) 1499–1510. [DOI Link](#)
9. J. D. Furman, G. Gundiah, K. Page, N. Pizzaro and A. K. Cheetham, Local structure and time-resolved photoluminescence of emulsion prepared YAG nanoparticles, *Chem. Phys. Lett.* (2008) 67–72. [DOI Link](#)
10. M. B. Smith, K. Page, T. Siegrist, P. L. Redmond, E. C. Walter, R. Seshadri, L. E. Brus, and M. L. Steigerwald, Crystal structure and the paraelectric to ferroelectric phase transition of nanoscale BaTiO_3 , *J. Am. Chem. Soc.* **130**(22) (2008) 6955-6963. [DOI Link](#)
11. K. Page, C. S. Schade, J. -P. Zhang, P. J. Chupas, K. C. Chapman, Th. Proffen, A. K. Cheetham, and R. Seshadri, Preparation and characterization of Pd_2Sn nanoparticles, *Mater. Res. Bull.* **42** (2007) 1969-1975. [DOI Link](#)
12. Y. -I. Kim, K. Page, A. M. Limarga, D. R. Clarke, and R. Seshadri, Local structure evolution in polycrystalline $\text{Zn}_{1-x}\text{Mg}_x\text{O}$ ($0 \leq x \leq 0.15$) studied by Raman and by synchrotron x-ray pair-distribution-function analysis, *Phys. Rev. B* **76** (2007) 115204(1-10). [DOI link](#)
13. K. Page, M. W. Stoltzfus, Y.-I. Kim, Th. Proffen, P. M. Woodward, A. K. Cheetham, and R. Seshadri, Local atomic ordering in BaTaO_2N studied by neutron pair distribution function analysis and density functional theory, *Chem. Mater.* **19** (2007) 4037-4042. [DOI Link](#)
14. J. Li, U. G. Singh, J. W. Bennett, K. Page, J. Weaver, J. -P. Zhang, Th. Proffen, A. M. Rappe, S. Scott, and R. Seshadri, $\text{BaCe}_{1-x}\text{Pd}_x\text{O}_{3-d}$ ($0 \leq x \leq 0.1$) Redox controlled ingress and egress of palladium in a perovskite, *Chem. Mater.* **19** (2007) 1418-1426. [DOI Link](#)
15. Y. -I. Kim, K. Page, and R. Seshadri, Synchrotron X-ray study of polycrystalline wurtzite $\text{Zn}_{1-x}\text{Mg}_x\text{O}$ ($0 \leq x \leq 0.15$): Evolution of crystal structure and polarization, *Appl. Phys. Lett.* **90** (2007) 101914 (1-3). [DOI Link](#)
16. O. Masala, D. Hoffman, N. Sundaram, K. Page, Th. Proffen, G. Lawes, and R. Seshadri, Preparation of magnetic spinel ferrite core/shell nanoparticles: Soft ferrites on hard ferrites and vice-versa, *Solid State Sci.* **8** (2006) 1015-1022. [DOI Link](#)
17. G. Lawes, B. Melot, K. Page, C. Ederer, M. A. Hayward, Th. Proffen, and R. Seshadri, Dielectric anomalies and spiral magnetic order in CoCr_2O_4 , *Phys. Rev. B* **74** (2006) 024413(1-6). [DOI Link](#)
18. Th. Proffen, K. L. Page, S. E. McLain, B. Clausen, T. W. Darling, J. A. TenCate, E. Ustundag, and S. Y. Lee, Atomic pair distribution function analysis of materials containing crystalline and amorphous phases, *Z. Kristallogr.* **220** (2005) 1002-1008. [DOI Link](#)
19. K. Page, Th. Proffen, H. Terrones, M. Terrones, L. Lee, Y. Yang, S. Stemmer, R. Seshadri, and A. K. Cheetham, Direct observation of the structure of gold nanoparticles by total scattering powder neutron diffraction, *Chem. Phys. Lett.* **393** (2004) 385-388. [DOI Link](#)

20. K. L. Page, Th. Proffen, S. E. McLain, T. W. Darling, and J. A. Tencate, Local atomic structure of Fountainebleau sandstone: Evidence for an amorphous phase ?, *Geophys. Res. Lett.* **31** (2004) L24606(1-4). [DOI Link](#)
21. Th. Proffen and K. L. Page, Obtaining structural information from the atomic pair distribution function, *Z. Kristallogr.* **219** (2004) 130-135. [DOI Link](#)
22. J. C. Hermanson, H. Johari, D. P. Stocker, U. G. Hegde, E. Ghaem-Maghami, and K. L. Page, Thermal characteristics and structure of fully-modulated, turbulent diffusion flames in micro-gravity, *AIAA* (2004) 0959(1-10).